Content

General framework

Procedure

Screening phase (step 1)

Calculation of emissions

Validation of scope

Allocation of emissions

Declaration

Annex

Supplement: Parameters of Green Logistics method
<table>
<thead>
<tr>
<th>Content Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annex</td>
</tr>
<tr>
<td>Logistics sites</td>
</tr>
<tr>
<td>Example (Allocation)</td>
</tr>
<tr>
<td>References</td>
</tr>
<tr>
<td>Acknowledgement &amp; Authors</td>
</tr>
</tbody>
</table>
Content

Annex

Logistics sites

Example (Allocation)

References

Acknowledgement & Authors
Challenges of ecological assessment of logistics sites (1)

There exists an enormous variety of logistics sites

<table>
<thead>
<tr>
<th>Transport mode / size</th>
<th>Logistics item / shipment</th>
<th>Processes / technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Image of a port with containers]</td>
<td>[Image of various types of cargo containers]</td>
<td>[Image of a warehouse and transportation equipment]</td>
</tr>
<tr>
<td>[Image of solar panels on a rooftop]</td>
<td>[Image of a pallet]</td>
<td>[Image of a forklift and warehouse interior]</td>
</tr>
<tr>
<td>[Image of a large parking lot]</td>
<td>[Image of mail in envelopes]</td>
<td>[Image of automated sorting machines]</td>
</tr>
</tbody>
</table>
The Green Logistics method distinguishes between two types of logistics sites

// Transshipment sites
- No relevant warehousing covered
- Examples: terminals, cross-docking hubs, Piece good & container transshipment, letter & parcel sorting centers

// Warehouses
- Warehousing operations need to be assessed
- Commissioning/picking operations and value added services are possible
- Examples: warehousing for pallets & containers, retail warehouses, distribution centers

// The logistics sites might be realized with or without building shells.
Challenges of ecological assessment of logistics sites (2)

// Shipments and services differ at one selected logistics site – Which process is required?
// Allocation procedure needs to address this challenge.
Challenges of ecological assessment of logistics sites (3)

// Data availability for resource consumption and its granularity

// Typical consumers at logistics sites
- Transshipment, conveyor and sorting technique
- Yard logistics
- Storage technique
- Order picking, (re-)packing
- Lighting
- Information and communication technology (ICT)
- Air-conditioning (heating, refrigeration, aeration)
- Administration
- Workshops
- ...

Example:
- 15.0 t stretch foil
- 1.0 t bubble wrap
- 0.5 t strapping tape
- 14.5 t shipping carton
- 2.0 t filler material
Emission sources at logistics sites

**Energy**
- Electricity
- Transport fuels
- Heating fuels

**Transport Safety & Packaging**
- Foil
- Cardboard
- Refrigerants
- Lubricants

**Maintenance**

**Production & Distribution**

**Logistics Site**
- Electricity
- Transport fuels
- Heating fuels

**Collection & Recycling**
- Recycling icon
- Recycling icon
Allocation of emissions at logistics sites
- General approach\(^{(1)}\) -

Emissions by source → Average allocation coefficient → Allocated emissions

Emissions per… [kg CO\(_2\)e/…]
- Ton
- TEU
- Pallet
- …

Emissions [kg CO\(_2\)e]

\[(kg \ CO_2e)_{\text{client}} = \frac{kg \ CO_2e}{TEU} \ast TEU_{\text{client}}\]

\(^{(1)}\) Within Green Logistics Method used for logistics sites where no differentiation between services and/or shipments is required
## Allocation of emissions at logistics sites
### - Differentiated approach (simplified) -

<table>
<thead>
<tr>
<th>Emissions by source</th>
<th>1. Sub-sets of emissions</th>
<th>2. Allocation coefficients</th>
<th>Allocated emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>floor area, tons,…</td>
<td>floor area, volume, tons, stock,…</td>
<td>clients’ use of services</td>
<td></td>
</tr>
</tbody>
</table>

### Emissions [kg CO₂e] for

- **Transshipment** (mode-specific)
- **Warehousing** (ambient / refrigerated)
- **Order-picking** (without / with)

### Emissions per… [kg CO₂e/…]

- **Ton, TEU**
- **Stock [m²],[m³]**
- **Number of outgoing logistics items**

---

*Green Logistics*
Allocation of emissions at logistics sites

Examples

**Average Allocation**

- **Parcel sorting center**
  - $kg\ CO_2e\ per\ parcel$
  - Not relevant

- **Terminal**
  - $kg\ CO_2e\ per\ TEU$
  - Specified for:
    - Ambient // reefer
    - Transshipped to mode A // B // C

- **Warehouse with order-picking**
  - $kg\ CO_2e\ per\ pallet$
  - Specified for:
    - Ambient // cooled
    - Large // small
    - Original // picked
Example for step 3.1: Differentiation between warehousing and transshipment

Key facts of selected combined logistics site:

- Transshipment building (1 floor): 12,000 m² with mixed corridors at gates
  ⇒ Assumption for mixed areas: 5 m width = ca. 2,500 m²
- Warehouse building (2 floors): 4,250 m²/ floor = 8,500 m² with
  storage area (5,300 m²), order-picking area (1,000 m²) and administration area (2,200 m²)

Combined logistics site

\[ A_{ts} = 12,000 \, m^2 - 2,500 \, m^2 = 9,500 \, m^2 \]
\[ A_s = 5,300 \, m^2 + 1,000 \, m^2 = 6,300 \, m^2 \]
\[ A_{mixed} = 2,200 \, m^2 + 2,500 \, m^2 = 4,700 \, m^2 \]
\[ A_{gross} = A_s + A_{ts} + A_{mixed} = 20,500 \, m^2 \]

Allocation share

\[ \%_{ts} = \frac{A_{ts}}{A_s + A_{ts}} = \frac{9,500 \, m^2}{15,800 \, m^2} = 60,1\% \]
\[ \%_s = \frac{A_s}{A_s + A_{ts}} = \frac{6,300 \, m^2}{15,800 \, m^2} = 39,9\% \]
References (1)


References (2)


The Green Logistics method for the ecological assessment of logistics services is the result of the collaboration of the entire project consortium and the specialist departments in the respective companies and has been discussed with the stakeholder group of the Green Logistics project.

The project is part of the EffizienzCluster LogistikRuhr, sponsored by the German Federal Ministry of Education and Research (BMBF) (Funding code 01IC10L06, http://www.green-logistics-network.de/).

We cordially thank all those involved for their cooperation and contributions.
List of authors

// Fraunhofer Institute for Material Flow and Logistics
// Arcadis
// Deutsche Bahn
// Deutsche Post DHL
// Fiege
// Goodman Deutschland
// Lufthansa Cargo
// Schmidt-Gevelsberg
// TÜV Rheinland
// UPS Deutschland
// Vanderlande Industries
// Wuppertal Institut

// Kerstin Dobers, Marc Schneider, David Rüdiger (allocation procedure)
// Gordon Mauer, Nicolas Rheinhardt
// Grischa Meyer
// Jörg Friedrichs
// Kai Alfermann
// Dirk Mölter
// Christina Yao, Bettina Mörth
// Marc Laux
// Ralf Röhrig
// Theodoros Athanassopoulos, Jörg Herden
// Dieter Jahn
// Andreas Pastowski